caplugs®

Your Rubber Molding Experts

Custom Molded Components | Masking Solutions | Product Protection

trusted supplier for more than 75 years

For more than 75 years, Caplugs has been **a leader in plastic, silicone and rubber molding**. We are committed to providing our customers with the **highest quality** products from a trusted partner.

Caplugs has the infrastructure, global footprint, molding capabilities, engineering resources, quality certifications and certified processes to meet your needs, with **local technical experts** around the globe. The Caplugs team will **collaborate with you** every step of the way to develop a solution that fits your exact requirements.

> **"Caplugs is your trusted supplier for custom molded components, masking solutions and product protection."**

Over **450,000,000** parts in stock.
15,000,000+ parts produced per day.
Over **40,000+** standard parts.
Over **400** molding machines.
Over **15** design engineers.
13 global manufacturing facilities.
The **1** partner you need.

With six different manufacturing processes, we are built to meet the needs of customers across a variety of industries. This range of capabilities ensures we can solve your challenge today, as well as your future challenges, helping you minimize your supplier base. Caplugs will deliver your components on time and on budget.

Quality Certifications

Caplugs has a comprehensive ISO-certified quality management system and the latest testing and measurement technologies to provide consistent quality.

Technical Support

Technical experts are spread across the globe ensuring personalized service. Our inside team of sales engineers and dedicated customer service representatives are available to help you every step of the way, from design and prototyping to delivery.

In-House Engineering

A team of in-house design engineers and chemists will consult one-on-one with you to design and develop a part to meet your needs.

Global Manufacturer

Caplugs is headquartered in the U.S. with manufacturing facilities throughout North America, Europe, China and Australia. With our global footprint, we can seamlessly service customers domestically and internationally.

Manufacturing Processes

Injection Molding

Vinyl Dip Molding

Extrusion

Vinyl Coating

Rubber Molding

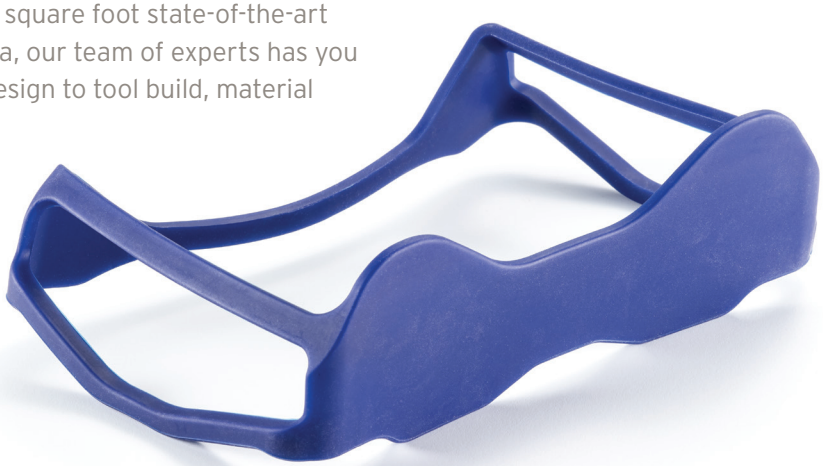
- Compression
- Transfer
- Injection

Die-Cutting

why choose Caplugs for your rubber molding needs?

Caplugs comprehensive rubber molding capabilities are done completely in house. At our 290,000 square foot state-of-the-art manufacturing facility in Jintan, China, our team of experts has you covered—from part design and tool design to tool build, material selection and full-volume production.

Our rubber tooling is developed in-house using durable P20 steel, ensuring the highest part quality and longest tool life.



How Caplugs Supports Your Rubber Molding Project Needs

1. **Engineering** Team for Part Design, Tool Design and Tool Build
2. Project **Management** & Technical Sales Support
3. **Dedicated** Service Team
4. In-House Compounding for Customized **Performance-Enhancing** Material
5. Full Material **Control** from Batch to Batch
6. ASTM Standards & Lab **Testing**
7. **Global** Manufacturing & Warehousing Facilities

Rubber Molding Processes

Compression Molding

We have more than 70 presses ranging from 100 to 1,200 tons. With compression molding, most prototypes are available in 15 days.

Transfer Molding

A similar process to compression, but enables more complex geometries

Injection Molding

Ideal for more complex geometries and tighter tolerances

Compound Mixing and Development

All materials for rubber molded components are formulated and mixed in house by our team of expert chemists to **ensure performance and consistency**. We have in-house mixing capabilities for both organic and silicone materials, including EPDM, NR, NBR, SBR, HNBR, CR, IR and FKM. To ensure components can stand up to the elements, material additives such as heat or UV resistance can be **easily compounded into your rubber molded parts**.

Our in-house chemists know rubber molding inside and out. They inspect and perform analysis, **compound testing**, performance simulation and processability/repeatability testing on each batch of rubber material, so you can be **confident** that the performance of your rubber molded components will **meet all required specifications**.

Custom Compound Options

- Custom coloring for branding
- Self-lubricated NR and CR for assembly issues
- UL94 5VA flame-resistant EPDM and CR
- Wear-resistant SBR
- FDA and medical-grade silicone
- High-temperature-resistant silicone with dielectric strength properties
- FDA grade EPDM

Quality Management Systems

Caplugs' **stringent quality management** systems are designed to meet customer expectations and manufacturing regulations. Our Production Part Approval Process **(PPAP) is a critical component** of our comprehensive quality management systems. PPAP provides traceability, record retention and **strict process controls** to ensure specifications are met.

ISO 9001
IATF 16949
ISO 14001
ISO 13485
REGISTERED

Our quality systems in the New York and Pennsylvania facilities are certified to ISO 9001 & IATF 16949. Our quality systems in our California and Texas facilities are certified to ISO 9001. Our Jintan, China cleanroom certification to the ISO 13485 Quality Management System is underway and expected summer 2023. Buffalo, New York ISO 13485 certification applies to all clean room medical products. Our environmental systems in the New York, Pennsylvania and California facilities are certified to ISO 14001.

Jintan facility equipped with a class 8 cleanroom for silicone compression molding and rubber injection molding

- 8,600 square feet
- 12 compression presses
- 4 injection presses
- Wide range of materials including FDA-approved rubbers & USP Class VI compliant elastomers
- Entire process from material compounding, part molding and packaging takes place in cleanroom
- US-based technical and sales teams to manage projects and support our team in China

Caplugs has streamlined the custom process to make it efficient and economical. Our project team will lead you through the 5-step process to quickly take you from part concept to full production and delivery.

1 > Discovery Process

A dedicated engineer will work with you one-on-one to identify and understand the application, environment and function of the part needed.

2 > Concept/Design

Your engineer will design a part to meet your specifications and recommend the best material for your environment. The team will review part- installation, functionality, lead time and price point to ensure we meet all project requirements.

3 > Economical Prototype Molds

Our engineers can provide a SolidWorks rendering or 3-D prototype in as little as 2 to 3 weeks.

4 > In-House Manufacturing

All manufacturing is done in house and controlled by our engineers and production team, ensuring quality parts and efficient timelines.

5 > Specialized Processes & Services

- Secondary Operations
- Cryogenic Deflashing
- Internal Testing Labs
- ASTM Standards Testing
- Assembly
- Special Packaging

expertise and experience across a wide range of industries

Serving as the leader in product protection for over 75 years, Caplugs' innovative products and extensive custom capabilities are designed to solve challenges across most industries – from leading automotive OEM's to medical device manufacturers. With comprehensive manufacturing capabilities, a wide range of material options and rigorous process control, we are a dedicated partner, providing you the solutions and service you need.

- General Manufacturing
- Automotive
- Medical
- Masking
- Energy/Oil & Gas
- Hydraulics
- Electronics
- Packaging
- Aerospace & Defense
- HVAC
- Fabrication
- Consumer

Rubber Bumper

Industry: Automotive

Application: Lift Gate Bumper

Volume: 1,000,000 pieces

Material: EPDM

Large Conduit Plug

Industry: HVAC

Application: Protective Plug for Industrial AC Unit to Secure Against Foreign Objects and Debris

Volume: 500,000 pieces

Material: EPDM

2" Diaphragm

Industry: Water Systems

Application: Commercial Plumbing Vacuum System

Volume: 10,000 pieces

Material: Butyl

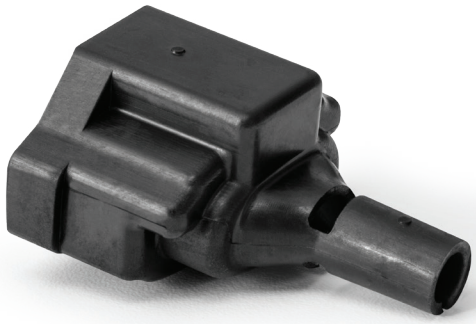
Rubber Ball

Industry: Metal Separation Equipment

Application: Rubber Balls Used in Screen Application

Volume: 100,000 pieces

Material: FDA EPDM and Silicone



Wiring Connector Cover

Industry: Heavy Equipment/Industrial

Application: Cover for Wiring on Connectors on Diesel Engines for Heavy Machinery

Volume: 25,000 pieces

Material: HNBR

Vibration Dampener

Industry: HVAC

Application: Dampener for Sound and Vibration

Volume: 750,000 pieces

Material: EPDM/Nitrile

Protective Plug

Industry: Automotive

Application: Plug for Truck Bed Liner

Volume: 1,000,000 pieces

Material: Extreme UV EPDM

Silicone Cap

Industry: Medical

Application: Protects Delicate Instrument Ends during Shipping and Storage

Volume: 30,000 pieces

Material: Silicone

Motor Mount Plug

Industry: Automotive

Application: Rubber Diverter for Engine Mount

Volume: 1,000,000 pieces

Material: High-density NR

Roofing Cap for Stand Pipes

Industry: Roofing

Application: Sealing Stand Pipes

Volume: 25,000 pieces

Material: Silicone/EPDM

Sheet Metal Body Plug

Industry: Automotive

Application: Body Plug to Seal Out Water and Environment

Volume: 1,000,000 pieces

Material: EPDM

Clamp

Industry: Industrial

Application: Cushions for Hose Clamp to Absorb Vibration and Noise Dampening

Volume: 500,000 pieces

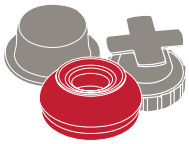
Material: EPDM, Silicone and Neoprene

Build Your Custom Rubber Part

To begin development of your custom rubber solutions, we need to start with the specifications.

- Material Review & Selection
- Dimensional Tolerance Review

Application Specific – Designed for your specific application, ensuring all size and tolerance requirements are met



Designed for Performance – Part developed for your environment, eliminating risk of part failure

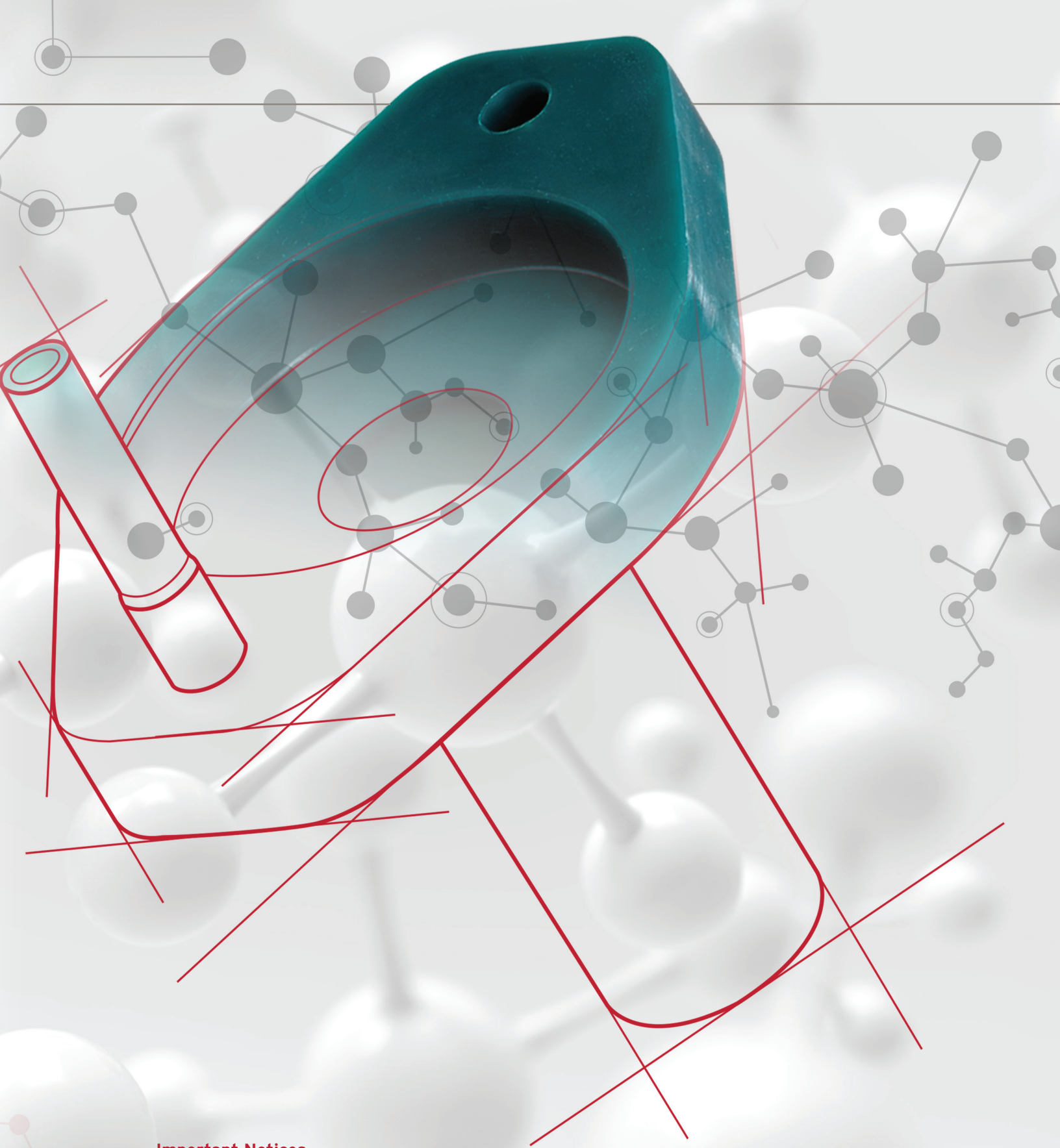
Added Value – Customization of material can actually add value to the part and your application, such as sound dampening

Exact Fit – Ensures easy installation and secure fit of part

Material Performance – Doing our own compounding enables us to add key performance features to our parts like heat resistance, UV/ozone resistance, vibration and sound dampening, chemical/fuel/oil resistance and more

Cost Effectiveness – Retrofitted components not designed for your application will cost you more time and risk than a custom solution

Short Lead Times – Our custom process is streamlined for lead times in just weeks, not months



Important Notices

All statements, technical information and recommendations related to Caplugs' products are based on information believed to be reliable. However, the accuracy or completeness is not guaranteed. Before using any Caplugs product you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in Caplugs' current publications, or any contrary statements contained on your purchase order, shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of Caplugs. Also, Caplugs currently has no processes or procedures in place to meet the California Transparency in Supply Chains Act of 2010.

selecting the right polymer for your application

Caplugs designs, develops and manufactures high-performance elastomeric components. Applications range from automotive and medical to home and garden, sporting goods and the appliance industry.

A = EXCELLENT B = VERY GOOD C = GOOD D = FAIR E = POOR

		Silicone	EPDM	Polychloroprene Rubber	Styrene Butadiene Rubber	Nitrile Rubber	Natural Rubber	Butyl Rubber
	Trade Names	Silastic, Elastosil, GE Silicones	Keltan, Vistalon, Royalene	Neoprene, Bayprene, Skyprene	Ameripol, Buna-S, ASRC	Nipol, Buna-N, Hycar, JSR-N, Krynac	SMR, SVR, SLR, SCR	Exxon Butyl, Polysar Butyl, JSR-Butyl
	Chemical Definition	Polydimethyl-siloxane	Ethylene Propylene Diene polymer	Polychloroprene	Styrene Butadiene polymer	Acrylonitrile Butadiene polymer	Polyisoprene	Polyisobutylene Isoprene
	ASTM D2000/SAE J200	GE, FC, FE	AA, BA, CA, DA	BC, BE	AA, BA	BF, BG	AA	AA, BA
	ASTM designation	VMQ	EPDM	CR	SBR	NBR	NR	IIR
Physical Properties	SG, basepolymer (g/cc)	1.0 - 2.0	0.86	1.23 - 1.25	0.94	1.0	0.93	0.92
	Hardness (ShoreA)	20 - 90	30 - 90	30 - 90	30 - 98	30 - 98	20 - 98	30 - 90
	Modulus at 100% strain (psi)	100 - 900	100 - 3000	100 - 3000	100 - 1500	100 - 1500	100 - 550	100 - 800
	Tensile strength ($x10^3$ psi)	0.2 - 1.5	0.3 - 3.5	0.5 - 3.5	0.5 - 3.5	1.0 - 4.0	1.0 - 4.0	2.0 - 3.0
	Elongation	100 - 800	100 - 800	100 - 800	100 - 700	100 - 700	300 - 900	300 - 800
	Abrasion resistance	E - B	B - A	B - A	A	C - A	A	D - C
	Compression set	B - A	E - C	E - C	C - A	C - A	A	E - C
	Flex cracking resistance	E - A	B	C - B	C	G	A	C - A
	Impact resistance	E - C	B	C - A	A	D - C	A	C
	Rebound resilience	B - A	C - B	D - B	E - A	C	C - A	E - D
	Tear resistance	E - B	C - B	D - C	D - A	C - A	C - A	C
	Volume Resistivity (Ohm - cm)	8×10^{13} - 1×10^{16}	3.5×10^3	1×10^{11} - 1×10^{17}	5 - 8.4×10^{13}	3.5×10^{10}	–	2×10^{16}
Thermal Properties	Brittle point (°F)	-60 to -178	-45 to -80	-20 to -60	-20 to -70	-20 to -60	-20 to -80	-20 to -80
	Max for cont. use (°F) (static)	+600	+350	+275	+250	+250	+250	+300
	Min for cont. use (°F) (static)	-178	-75	-58	-65	-58	-76	-75
	Gas permeability	E - D	D - C	D - C	D	D - C	D - C	C
	Oxidation resistance	A	A	A	D - A	C	C - A	A
	Ozone resistance	A	A	B - A	E - A	E - D	E	A
	Radiation resistance	B	B	C	E	D - C	D - C	E - C
	Shelf - life, cool dry, no radiation (years)	20	5 - 10	5 - 10	2 - 5	2 - 5	2 - 5	5 - 10
	Steam resistance	D	A	C	D - C	D - C	D - C	C - A
	Weather resistance	A	A	E - C	D - C	E - D	E - D	A
	Water resistance	A	A	D - C	C - A	C - A	A	C - A
Chemical Resistance	Acids, concentrated	E - D	A	E	E - C	D - C	D - C	D - A
	Acids, diluted	D - C	A	A	D - C	C	C - B	C - A
	Acids, inorganic	D - C	A	C - A	D - C	D - C	D - C	C
	Acids, organic	D - C	B - A	E - A	E - C	E - C	D - C	C - A
	Alcohols	D - C	C - A	A	C	D - C	C - A	C - A
	Animal & vegetable oils	C - A	C	C	E - C	C - A	E - C	C - A
	Brake fluids, non petro based	A	C - A	D	E - C	E	C	C
	Esters	C	A	E	E	E	E	B - A
	Ethers	E	D	E	E	E	E	E - D
	Halogenated solvents	E	E	E	E	E	E	E
	Hydrocarbon, halogenated	E	E	E	E	E - D	E	E
	Ketones	E	C - A	E - D	E - C	E	D - C	E - A
	Lacquer solvents	E	E	E	E	D - C	E	D - C
	L.P. gases and fuel oils	D	E	C	E	A	E	E
	Mineral oil	E	E	D - C	E	A	E	E
	Petroleum aromatic	E	E	C	E	C	E	E
	Petroleum non - aromatic	C	E	C	E	A	E	E
	Refrigerant ammonia	A	C	A	C	C	C	C
	Refrigerant haloflurocarbons	E	R12, 13, 22	R11, 12, 13, 22	R12, 13, 22	R11, 12, 13	R12, 13, 22	R12, 13, 22
	Refrigerant haloflurocarbons w/oil	E	E	R11, 12, 22	E	R11, 12, 13	E	E
	Adhesion to metal	C - A	C - A	A	A	A	A	C
	Adhesion to rigid material	D - A	D - C	C - A	A	C - A	A	D - A
	Silicone oil	E - D	A	D - A	E	C	C	E

We've made it simple to find the right polymer material for your protective solution. Polymers are rated based on factors like their resistance to various chemicals, as well as their thermal and physical properties.

A = EXCELLENT B = VERY GOOD C = GOOD D = FAIR E = POOR

		Fluoroelastomer/ Fluorocarbon	Isoprene Rubber	Fluorosilicone	Acrylic Rubber	Butadiene Rubber	Urethane	HNBR
	Trade Names	Viton, Fluorel	Synthetic Polyisoprene	Silastic, GE	Hycar, Krynac, ACM	Nipol-BR, Buna-CB, JSR-BR	Vibrathane	Therban, Zetpol
	Chemical Definition	Polydimethyl-siloxane	Polyisoprene	Fluorovinyl Methyl Siloxane	Copolymer Ethyl Butyl Acrylate	Polybutadiene	Polyester or Polyether Urethane	Hydrogenated Acrylonitrile Butadiene
	ASTM D2000/SAE J200	HK	AA	FK	EH	AA	BG	DH
	ASTM designation	FKM	IR	FVMQ	ACM	BR	PU	HNBR
Physical Properties	SG, basepolymer (g/cc)	1.4 - 2.0	0.92	1.1 - 2.2	1.1	0.94	1.05	1.12
	Hardness (ShoreA)	50 - 95	30 - 98	35 - 80	40 - 90	45 - 80	50 - 85	40 - 90
	Modulus at 100% strain (psi)	200 - 2000	100 - 1500	100 - 1000	100 - 1500	300 - 1500	250 - 5000	300 - 2900
	Tensile strength ($x10^3$ psi)	0.5 - 2.5	2.5 - 4.0	0.5 - 1.4	1.2 - 1.5	2.5 - 3.0	1.5 - 8.0	1.5 - 5.0
	Elongation	100 - 500	100 - 750	100 - 480	100 - 450	100 - 650	150 - 600	150 - 550
	Abrasion resistance	C	A	E	D - C	A	A	C - A
	Compression set	C - A	A	D - C	E - C	C	E - C	C - A
	Flex cracking resistance	C	A	E - C	D - C	D - A	C - A	C
	Impact resistance	C	A	E - C	E	C	A	A
	Rebound resilience	D - B	A	A	D - C	D - A	E - B	–
	Tear resistance	D - B	C - A	E - A	E - C	C - A	A	D - C
	Volume resistivity (Ohm - cm)	2.0×10^{13}	–	1×10^{12} - 1×10^{14}	7×10^{12}	–	0.3×10^{10} - 5×10^{14}	–
Thermal Properties	Brittle point (°F)	-15 to -40	-70	-85	-14 to -40	-150	-60 to -100	-40
	Max for cont. use (°F) (static)	+600	+180	+450	+400	+200	+250	+300
	Min for cont. use (°F) (static)	-40	-60	-80	-40	-50	-65	-40
	Gas permeability	C - A	D - C	E - C	C - A	C	C - A	C
	Oxidation resistance	A	C	A	A	A	C - A	A
	Ozone resistance	A	E	A	C - A	A	A	C - A
	Radiation resistance	D - C	D - C	D - A	E - C	E - C	C - A	C
	Shelf - life, cool dry, no radiation (years)	5 - 20	2 - 5	20	20	2 - 5	2 - 15	2 - 5
	Steam resistance	E - C	C	D - C	E	D - C	E	A
	Weather resistance	A	A	A	E - D	C - A	C	A
	Water resistance	A	E - D	A	A	A	A	C - A
Chemical Resistance	Acids, concentrated	C - A	E - C	C	C - A	D - C	E	D - C
	Acids, diluted	C - A	D - C	A	A	D - C	D - C	A
	Acids, inorganic	A	C	D - A	C - A	C	E - D	D - C
	Acids, organic	E - C	D - C	D - C	E - C	E - C	E - D	D - C
	Alcohols	D - A	C	D - C	A	D - C	C	A
	Animal & vegetable oils	A	E - C	A	D - C	E - C	D - A	A
	Brake fluids, non petro based	D	C	A	–	E - C	E	D
	Esters	E - B	E	E - C	C	E	E	E - D
	Ethers	E	E	D	C	E	D	E - D
	Halogenated solvents	C - A	E	B	E	E	E - C	E - D
	Hydrocarbon, halogenated	A	E	C - B	E	E	D - C	E
	Ketones	E	C	E	D - C	C	E	E
	Lacquer solvents	E	E	E	D	E	E	D
	L.P. gases and fuel oils	A	E	A	C - A	E	D - C	A
	Mineral oil	A	E	C - A	C - A	E	C - A	–
	Petroleum aromatic	A	E	C	C	E	C	C - A
	Petroleum non - aromatic	A	E	C	D - C	E	C	–
	Refrigerant ammonia	E	C	A	E - C	C	E	E - C
	Refrigerant haloflurocarbons	R11, 12, 13	R12, 13, 22	R11, 12	E - C	R12, 13, 22	R12	R11, 12, 112
	Refrigerant haloflurocarbons w/oil	R11, 12, 13	E	R11, 12	–	E	E	R12, 112
	Adhesion to metal	C - A	A	C - A	D - C	C	A	A
	Adhesion to rigid material	D - C	A	D - C	D - C	D - A	C	C - A
	Silicone oil	A	C	A	–	E	A	D - A

Drawing Designation "A2" Precision

Drawing Designation "A2" tolerances indicate a precision product. Molds must be precision-machined and kept in good repair. While measurement methods may be simpler than with Drawing Designation "A1," careful inspection will usually be required.

Size Above	(Inches) Incl.	Fixed	Closure
0	.40	± .004	± .005
.40	.63	± .005	± .006
.63	1.00	± .006	± .008
1.00	1.60	± .008	± .010
1.60	2.50	± .010	± .013
2.50	4.00	± .013	± .016
4.00	6.30	± .016	± .020

6.30 and over – To find fixed dimensional tolerances, multiply by 0.4%.

Drawing Designation "A3" Commercial

Drawing Designation "A3" tolerances indicate a "commercial" product and will normally be used for most products.

Size Above	(Inches) Incl.	Fixed	Closure
0	.40	± .006	± .008
.40	.63	± .008	± .010
.63	1.00	± .010	± .013
1.00	1.60	± .013	± .016
1.60	2.50	± .016	± .020
2.50	4.00	± .020	± .025
4.00	6.30	± .025	± .032

6.30 and over – To find fixed dimensional tolerances, multiply by 0.4%.

Dimension Terminology

The following will provide a common terminology for use in discussing dimensions of molded rubber products, and for distinguishing various tolerance groupings.

Fixed Dimensions

(Dimensions not affected by flash thickness variation) Definition – Parallel to mold parting line or the parting lines of major mold sections. In the case of a simple wheel, with half the wheel formed in each half of the mold and the flash line around the O.D., the O.D. and the hub diameter are fixed dimensions. Holes formed by solid pins will usually be included in the classification.

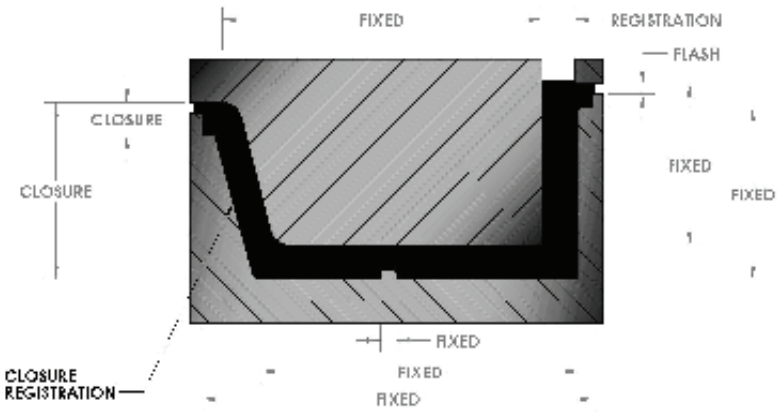
Closure Dimensions

(Dimensions affected by flash thickness variation) Definition – Vertical to the mold parting line or to parting lines of major mold sections. In addition to the shrinkage, mold-maker's tolerance, trim and finish, a number of other factors affect closure dimensions. Among these are flow characteristics of the raw stock, weight and shape of stock, types of flash grooves or other relief devices. These conditions all affect the degree of mold closure.

While closure dimensions are affected by flash-thickness variation, they are not necessarily related to basic flash thickness. If a manufacturer plans to machine or die trim a product, the mold will be planned with an artificial flash, which would be thicker than if hand deflashing or tumble trim were to be employed. Thus, products purchased from two sources could have a different basic flash thickness at the parting line and yet meet the drawing dimensions. There is usually a logical place for the mold designer to locate the parting line for best dimensional control. If the product design limits this location, an alternate mold construction will be required, which may affect the tolerance control on the product, and may, in some cases, increase the cost of the mold.

When applying tolerances, the following rules should be kept in mind:

1. Fixed dimension tolerances apply individually to each fixed dimension by its own size.
2. Closure dimension tolerances are determined by the largest closure dimension, and this single tolerance is used for all other closure dimensions.
3. Fixed and closure dimensions for a given table do not necessarily go together and can be split between tables.
4. Tolerances not shown will be determined upon consultation with the rubber manufacturer.
5. Care should be taken in applying standard tolerances to products having wide sectional variations.



Unlike rigid machined materials, thermoset molded elastomers do not lend themselves to the same level of tolerancing. Being thermally molded, elastomers are subject to many variables. Temperature, cure time, mold tolerance, mold registration, compound variation and shrinkage are just some factors all molders encounter. The Rubber Manufacturers Association (RMA) has developed tolerance tables with ranges to provide communications between users and providers across a wide range of industries, from precision aerospace electronic components to open tolerance products for consumer goods. These tolerance designations relate to the variability inherent in processing molded rubber parts, and are referred to as **RMA A2 "Precision"** and **RMA A3 "Commercial"** dimensional tolerance designations. There are obviously costs involved as the rubber molder prepares to meet customer requirements at the RMA A2 level. These include preparations for tooling, extra features, cavity finishes and cavity-flow provisions. In processing, very close temperature control and timing of molding cycles may also add to the cost of the part.

The type of rubber material and, particularly, its durometer hardness will determine if the part will experience substantial size change during its cool down.

"A2" Precision Drawing Designation
Dimensional Tolerance Table for Molded Rubber Products

Size (Millimeters)			Fixed	Closure	Size (Inches)			Fixed	Closure
Above		Included			Above		Included		
0	-	10	+/-.16	+/-.20	0	-	.40	+/-.006	+/-.008
10	-	16	.20	.25	.40	-	.63	.008	.010
16	-	25	.25	.32	.63	-	1.00	.010	.013
25	-	40	.32	.40	1.00	-	1.60	.013	.016
40	-	63	.40	.50	1.60	-	2.50	.016	.020
63	-	100	.50	.63	2.50	-	4.00	.020	.025
100	-	160	.63	.80	4.00	-	6.30	.025	.032
160	- & Over				6.30	- & Over			
	Multiply by		.004	.005		Multiply by		.004	.005

"A3" Commercial Drawing Designation
Dimensional Tolerance Table for Molded Rubber Products

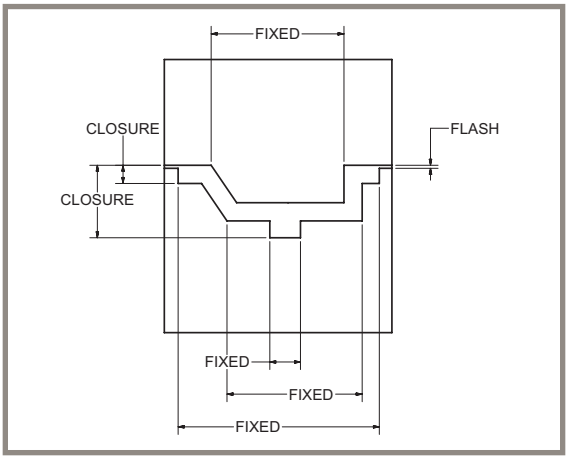
Size (Millimeters)			Fixed	Closure	Size (Inches)			Fixed	Closure
Above		Included			Above		Included		
0	-	10	+/-.20	+/-.32	0	-	.40	+/-.008	+/-.013
10	-	16	.25	.40	.40	-	.63	.010	.016
16	-	25	.32	.50	.63	-	1.00	.013	.020
25	-	40	.40	.63	1.00	-	1.60	.016	.025
40	-	63	.50	.80	1.60	-	2.50	.020	.032
63	-	100	.63	1.00	2.50	-	4.00	.025	.040
100	-	160	.80	1.25	4.00	-	6.30	.032	.050
160	- & Over				6.30	- & Over			
	Multiply by		.005	.008		Multiply by		.005	.008

Very soft rubbers (15 to 30 durometer) will be in a 3% to 4% shrink category.

Firm to almost rigid compounds (65 to 85 durometer) will shrink 1-1/2% to 2%, allowing for tighter tolerances.

- **Soft parts are best inspected on an optical comparator versus calipers or gauges.**
- **Thin wall parts may be checked on a template or on the hardware itself for fit and function.**

One critical factor in assuring consistent quality is the number of dimensions the custom molder should track during processing. We at Caplugs recommend two, and suggest no more than three.



Basic Closure Dimension:

This is the dimension across the parting of the plates in the mold. This dimension will always run with somewhat greater variation compared to the fixed dimensions within the cavities. (See Tool Cavity Cross-Section Sketch above.) The opening and closing of the mold has variations. This is recognized in the RMA tables.

Fixed Cross-Sections:

Long, relatively thin parts will run with more variation in their length. The dimensioning and tolerance should allow for a little stretch in installation. If the part is too long, it will not bunch or compress in place.

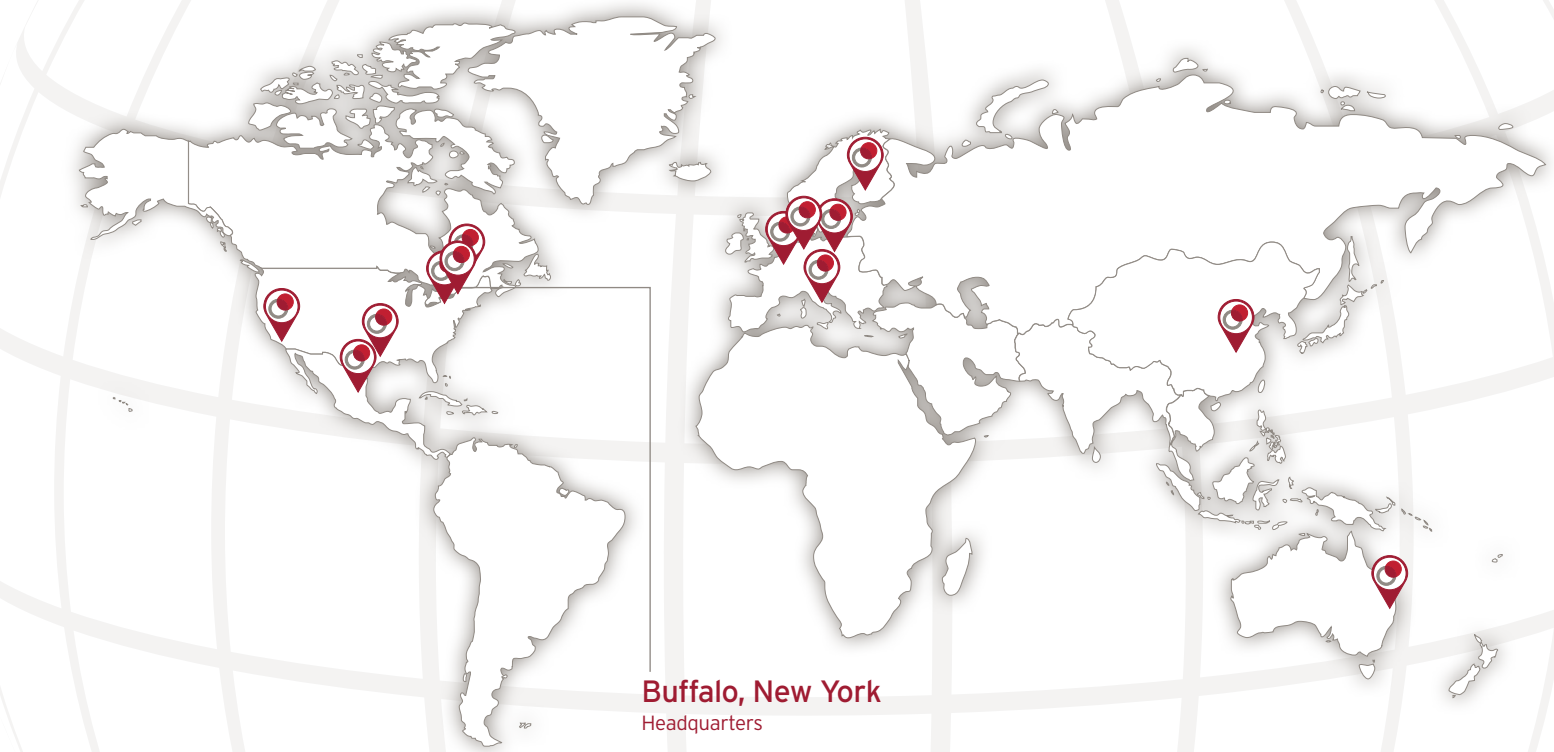
Often it is practical to machine a prototype cavity to evaluate how well the fit and function of prototype parts suit the application. Changes can be made in dimensions and tolerances when applied to the production cavities. A prototype cavity can be cut in plates suitable for expansion to production cavities. This provides savings in tooling overall.

Regarding "A2" tolerancing and tighter, it is desirable that the exact method of measurement be agreed upon, as errors in measurement may be significant in relation to the tolerance.

Although mold-cavity dimensions and the actual dimensions of the part will inevitably vary, an experienced custom molder can apply past experience with similar parts and specific material shrink rates to hold specified tolerances. For example, Caplugs combines technical details from previously run components and specific material-shrinkage rates to the design of new molds.

Shrinkage occurs during molding of all rubber components and is a volume effect. Although built into the mold, it will vary depending on the part complexity within the same cavity. It occurs when the part is removed from the heated mold and allowed to cool. The engineering challenge is to cut a steel cavity that will reliably provide acceptably toleranced rubber parts. Given today's close-tolerance, thin cross-section designs, your need for precision molded parts has never been more apparent.

Caplugs is the leader in custom molded components, masking solutions and product protection. With 13 global manufacturing facilities and a large team of in-field sales managers, we provide the personalized service, range of capabilities, manufacturing expertise and scalable infrastructure to be your trusted partner.



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